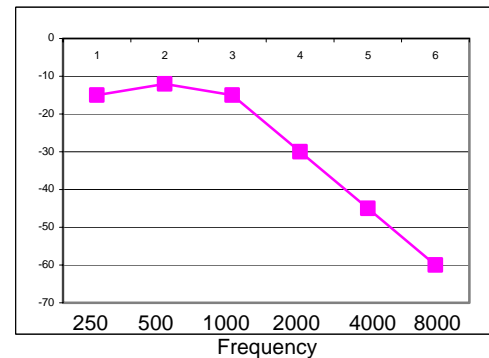


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- 8.0 References**
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1.0 Purpose/Scope

This procedure defines SHSD policy and provides guidelines for conducting Industrial Hygiene investigations and evaluations of identified Standard Threshold Shift (STS) changes in a worker's hearing by the Occupational Medicine Clinic. It is used in conjunction with the ES&H Standard 2.4.0 and SHSD IH96 series procedures.

The IH Group provides professional assistance and commits to investigate every occurrence of STS when provided notification by BNL's Clinic, a division/department, or the Industrial Safety Group. The mechanism to insure that commitment will be inclusion of STS cases into the SHSD FATS systems with closure of conditions and actions when appropriate documentation is generated.

Investigations will be conducted to determine the work conditions of the affected employee and extenuating circumstances from non-work issues. The overall purpose of the investigation is to:

- identify site conditions, personal procedures, or PPE, which should be altered to minimize work related noise exposures; and
- determine the likelihood that the hearing shift may be work related.

Investigations will consist of:

- Initial interviews conducted with the line organizations supervisor and the affected worker to determine the need for, and extent of, follow-up monitoring.
- Review of the employee's department/division documentation on investigations of occurrences, if any.

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- Employee exposure assessments, if needed, with a sound level meter (SLM) or noise dosimeter.

The SLM measures instantaneous noise levels at specific locations whereas a dosimeter logs the exposure of the worker as they move through the work area. SLMs may be used to provide initial information for determining the need for personal dosimetry. The microphone of the dosimeter is clipped on the workers collar and closely represents the actual exposure of the ear to the noise source. Logged exposure data is compared to occupational exposure limits to determine compliance with hearing conservation regulations. SLMs are typically used in conjunction with dosimeters to provide additional information on the relationship between noise exposure and specific tasks as well as to verify dosimeter operation.

2.0 Responsibilities

- 2.1 Use of this SOP shall be limited to a competent hazard assessment person, such as an IH Professional (IHP) from SHSD.
- 2.2 Personnel that perform exposure monitoring shall act under the guidance of an IHP in accordance with this procedure and an *Instrument Operation* SOP for a particular meter. They are responsible to follow all steps in the various specific procedures.
- 2.3 The data collected under this procedure will be evaluated by the cognizant IHP designated to conduct the work.

3.0 Definitions

- 3.1 *Decibel (dB)*: A non-dimensional unit used to express sound pressure levels. It is the log of the ratio of the measured sound pressure level to a reference level.
 - *dBA*: A sound pressure level in decibels made on the A-scale of a sound level meter. This unit of measure approximates the response of the human ear.
 - *dBC*: Sound pressure based on a nearly flat, non-weighted scale.
- 3.2 *Occupational Exposure Limit (OEL)*: The maximum time weighted average (TWA) exposure permitted for employee exposure, based on the lesser of the current OSHA Permissible Exposure Limit (PEL) or ACGIH Threshold Limit Value (TLV):
- 3.3 *Standard Threshold Shift (STS)*: OSHA has defined an STS as a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

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4.0 Prerequisites

4.1 Area Access:

- 4.1.1 Contact the appropriate Facility Support Representative or FS Technician to obtain approval to enter radiological areas.
- 4.1.2 Verify with the appropriate Facility Support Representative or FS Technician if a Work Permit or Radiological Permit is needed or is in effect. If so, review and sign the permit.
- 4.1.3 Contact the worker's supervisor to determine any specific PPE or training required for entry to the employee's work area.

5.0 Precautions

5.1 Hazard Determination:

- 5.1.1 The investigation does not create an exposure to any chemical, physical, or radiological hazards or generate Hazardous Waste.
- 5.1.2 However, the investigation will always include a site visit to the employee's work area where excessive noise levels exist or are suspected to be present. Exposures to noise levels above the PEL and/or TLV may cause temporary or permanent hearing loss. Exposures to other hazards will be evaluated on a case-by-case basis by the IH Professional.

5.2 Personal Protective Equipment:

In areas where noise levels exceed or are expected to exceed the *OEL*, hearing protection must be worn. The hearing protection should be used to reduce the noise levels below the *OEL*.

- 5.2.1 Additional PPE: Other appropriate PPE for hands, feet, skin, head, or eyes may be needed for the area being entered. Check with the area's supervisor, ES&H coordinator and FS Representative.

6.0 Procedure

6.1 Conducting an STS Investigation.

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- 6.1.1 The IH Group Leader or designated representative receives and assigns the case to a specific IH Professional. The case is entered into the SHSD FATS system.
- 6.1.2 The assigned IH Professional reviews the notice of Illness/Injury Report provided by the Occupational Medicine Clinic and/or the Request for IH Field Services Follow-up from the Safety Engineering Group (see Attachments 1 & 2 respectively) and seeks additional information if needed.
- 6.1.3 The IH Professional contacts the worker's supervisor to set an appointment for the initial discovery meeting. The supervisor and employee may be interviewed separately or together, however, a single joint meeting is recommended.
- 6.1.4 During the interview(s), the IH Professional completes the Employee Noise Exposure Questionnaire (Attachment 3).
 - 6.1.4.1 If further information is needed, the IH Professional contacts any necessary individuals and interviews them to collect the required data.
 - 6.1.4.2 The IH Professional searches IH database and formal reports to collect, review and verify previous monitoring meets current standards.
 - 6.1.4.3 The IH Professional identifies the hearing conservation group to which the employee belongs, if applicable.
- 6.1.5 Once the initial information is gathered and reviewed by the IH Professional, s/he determines if monitoring may be necessary.
Examples: (1) the employee has worked for the last two years in a quiet environment there may be no need to conduct monitoring; (2) if employee has worked in one location and there are one or more sources of potential exposure a sound survey and/or dosimetry may be required; and (3) if employee has worked in multiple locations with various exposure levels, extensive dosimetry may be required to fully characterize the workers exposure.

6.2 Evaluation and Report

- 6.2.1 Upon completion of the interviews, document review, and monitoring, the IH professional assesses the worker's typical exposure and prepares a written evaluation of the work area(s) and recommended response action(s).
- 6.2.2 At a minimum when exposures are found to be above the OEL, recommendations will include the follow-up procedures as stated in OSHA 29 CFR 1910.95 as follows:

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| Condition | Response |
|--|---|
| Employee not using PPE | a. Trained in hearing protector use and care b. Fitted with appropriate hearing protectors |
| Employee already using hearing protection | a. Refitted b. Re-trained c. Provided hearing protection with greater attenuation |
| Employee needs additional testing or if medical pathology of ear may be caused/aggravate by wearing hearing protectors | Refer for a clinical audiological evaluation or otological examination as appropriate |

6.2.3 A copy of the incident investigation report is sent to the Occupational Medicine Clinic, the IH Safety Group representative, the affected worker, and his/her supervisor.

7.0 Implementation and Training: Training prior to using this procedure:

- 7.1 The IH Professional is designated by the IH Group leader, as proficient to conduct the investigation based on demonstrated ability, education, and experience to:
 - 7.1.1 define monitoring needs,
 - 7.1.2 conduct or direct the field monitoring,
 - 7.1.3 review the collected data,
 - 7.1.4 provide a reasonable response action plan as necessary,
 - 7.1.5 be familiar with the ESH noise standard & IH hearing/noise related SOP's, and
 - 7.1.6 be familiar with procedures for accident/incident investigations.
- 7.2 Training for entry into restricted areas may be required (check with ESH coordinator or FS Representative for the facility).
- 7.3 Noise and Hearing Conservation Training and a Baseline audiogram may be needed if the exposure to the person performing the survey will be in excess of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV), which ever is less.

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8.0 References

- 8.1 BNL ES&H Standard 2.4.0
- 8.2 OSHA Noise/Hearing Conservation Standard 29CFR1910.95.
- 8.3 NIOSH Criteria for a Recommended Standard-Occupational Noise Exposure, 1998
- 8.4 ACGIH American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices 2001.

9.0 Attachments

- 9.1 Occupational Medicine Clinic: Notice of Illness/Injury Report
- 9.2 Industrial Safety: Request for Field Services Follow-up
- 9.3 SHSD: Employee Noise Exposure Questionnaire

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Added attachment 8.4 on STS employee notification and training on PPE use and fitting

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Attachment 8.1

BROOKHAVEN NATIONAL LABORATORY EMPLOYEE ILLNESS/INJURY REPORT

| | |
|--|--|
| INJURED | Name: _____ Occupation: _____ Supervisor: _____ Organization: _____ <input type="checkbox"/> BNL Staff <input type="checkbox"/> Life Number <input type="checkbox"/> Guest <input type="checkbox"/> Visitor <input type="checkbox"/> Other _____ |
| INJURY | Date first reported to Clinic: _____ Date of injury: _____ Time: _____ Description – as given by injured: _____ _____ Did accident occur during (regular) (shift) (after) hours? Place where accident occurred: _____ Witness to accident: Y/N Has injured visited personal physician? (yes) (no) Interviewer: _____ Date: _____ |
| RESULT | Diagnosis: _____ Category of injury: <input type="checkbox"/> Work incurred <input type="checkbox"/> Athletic or other _____ Treatment rendered by clinic: <input type="checkbox"/> First Aid <input type="checkbox"/> Medical Treatment <input type="checkbox"/> Sent Home (Time) _____ <input type="checkbox"/> Expected duration of absence: _____ <input type="checkbox"/> Sent to doctor (Name of doctor if known): _____ <input type="checkbox"/> (Sent) (Taken to) _____ <input type="checkbox"/> Returned to work ____ (Reg) ____ (Mod) Please specify if (Mod): _____ <input type="checkbox"/> If there is a restriction, will this apply to work? Y/N <input type="checkbox"/> Requested to return to Clinic on: _____ |
| SPECIAL INSTRUCTIONS AND COMMENTS | _____ _____ _____ _____ |

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Attachment 8.2

Sample of the SHSD Safety Engineering Request for Field Services Follow-up

| | |
|--|-------|
| SE REQUEST FOR IH FIELD SERVICES FOLLOUP | |
| Complaint/Employee Concern | _____ |
| Vibration Hazard | _____ |
| Hearing Conservation/Noise (STS) | _____ |
| Force (push/pull/lift) | _____ |
| Non-ionizing Radiation | _____ |
| Indoor Air Quality Evaluation | _____ |
| Exposure to Tick or Rodent Borne Diseases | _____ |
| Biological Hazard Evaluation | _____ |
| Repetitive Motion Trauma (Non-work Station) | _____ |
| Repetitive Motion (Work Station Related) | _____ |
| Lighting | _____ |
| Chemical Exposure Monitoring | _____ |
| Respiratory Protection | _____ |
| Occupational Illness (dermatitis, etc.) | _____ |
| Hazardous Material Related | _____ |
| Other (indicate) | _____ |
| Type of Request | |
| Date Request Made: | _____ |
| What Supporting documents were provided to IH? | |
| _____ | |
| Reason for Request: | |
| _____ | |
| Date Employee Signs/symptoms Reported to OMC | _____ |
| Signs/symptoms: | _____ |
| _____ | |
| IH Field Services Follow-up Plan (survey, dosimetry, JHA, etc.): | |
| _____ | |
| _____ | |
| Follow-up Completion Date: | |
| _____ | |
| IH Field Services Personnel Involved: | |
| _____ | |
| Results/Comments: | |

The only official copy is on-line at the SHSD IH Group website.
Before using a printed copy, verify that it is current by checking the document issue date on the website.

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Attachment 8.3

SAFETY AND HEALTH SERVICES DIVISION EMPLOYEE NOISE EXPOSURE QUESTIONNAIRE

| | | | | | |
|--|--------------------------|--|---|-----------------------------|------------------------|
| EMPLOYEE NAME _____ LAST INITIALS | | DIVISION _____ | DATE STS STS _____dB | INTERVIEW DATE _____ | BNL LIFE# _____ |
| CURRENT AMBIENT SPL RANGE _____dB(A) | SLM BNL# _____ | HC PROGRAM PARTICIPANT? <input type="checkbox"/> YES <input type="checkbox"/> NO | SUPERVISOR _____ LAST, FIRST INITIALS BADGE # | | PHONE _____ |
| REQUESTOR _____ LAST, FIRST INITIALS BADGE # | | SHSDINVESTIGATOR _____ LAST, FIRST INITIALS BADGE # | | | |

Job Title: _____ How Long? _____
 Job Description: _____

Does the employee work in areas or use equipment that employee considers loud or that is labeled as a hazardous noise area? ☐ Yes ☐ No
 If yes, please describe. _____

| Location/Equipment | Duration | Frequency | Ave. SPL | Continuous/Impact |
|--------------------|----------|-----------|----------|-------------------|
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ |

Comments/Controls: _____

Was the employee exposed to loud noises on previous jobs? ☐ Yes ☐ No If yes, please describe. _____

| Date | Type of Job | Equipment | Duration | Frequency | Ave. SPL | Cont/Impact |
|-------|-------------|-----------|----------|-----------|----------|-------------|
| _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ | _____ | _____ |

Comments: _____

Has the employee been exposed to traumatic noise (e.g. gunfire, explosion) in past six months that the employee considers loud: ☐ Yes ☐ No
 If yes, please describe: _____

Has the employee had current or past military service noise exposures: ☐ Yes ☐ No If yes, please describe: _____

Is the employee right or left-handed? ☐ right ☐ left

Does the employee use hearing protective devices: ☐ Yes ☐ No. If yes, what type? ☐ Muffs ☐ Plugs ☐ Both. Specify the listed
 NRR _____dB, and the adjusted NRR _____dB.

Is the attenuation afforded appropriate for the noise level and frequencies, i.e., reduces the ambient noise below 85 dB? ☐ Yes ☐ No If no,
 what is recommended? _____

The only official copy is on-line at the SHSD IH Group website.
Before using a printed copy, verify that it is current by checking the document issue date on the website.

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Attachment 8.3 SAFETY AND HEALTH SERVICES DIVISION EMPLOYEE NOISE EXPOSURE QUESTIONNAIRE (page 2)

| Occupational Exposures | Yes | Exposure Duration | Non-occupational Exposures | Yes | Exposure Duration |
|-----------------------------|-----|-------------------|------------------------------|-----|-------------------|
| Grinding | | | Hunting/shooting | | |
| Power Tool Operation | | | Power tool operation | | |
| Chain saws | | | Chain saws | | |
| Grass Cutting | | | Grass cutting | | |
| Generators/pumps | | | Model airplane flying | | |
| Compressors | | | Powered watercraft operation | | |
| Metal working machines | | | Metal working machines | | |
| Woodworking | | | Woodworking | | |
| Impact equipment/air driven | | | Air driven tools | | |
| Earth moving equipment | | | Farm machinery | | |
| Hammering activities | | | Hammering activities | | |
| Shop vacuum | | | Shop vacuum | | |
| Explosions/firearms | | | Scuba diving | | |
| High pressure discharges | | | Loud music/concerts | | |
| Ventilation systems | | | Flying, non-commercial | | |
| Compacting equipment | | | Contact sports | | |
| Communications equipment | | | Motor vehicle racing | | |
| Other | | | Other | | |

Additional Comments: _____

Based on field review, SHSD ☐ **Recommends**, ☐ **Does not recommend** a comprehensive noise evaluation. Evaluation scheduled for: _____

Date: _____

Historical data:
 Area sound level at work position _____ dBA, Personal exposure _____ dBA as 8 hr. TWA, Date: _____
 Area sound level at work position _____ dBA, Personal exposure _____ dBA as 8 hr. TWA, Date: _____
 Area sound level at work position _____ dBA, Personal exposure _____ dBA as 8 hr. TWA, Date: _____
 Comments: _____

Evaluation Results:
 Area sound level at work position _____ dBA, Personal exposure _____ dBA as 8 hr. TWA, Date: _____
 Comments (include information regarding impact and peak exposures) _____

☐ Include employee in the similar exposure group (SEG) specified as _____
☐ No SEG exists for this job activity.

Determination:
 SHSD determined that the subject employee ☐ **does**, ☐ **does not** have the potential to be exposed at or above the 8 hr. TWA ☐ **standard of 85BA**, ☐ **peak exposures >140 dB** on one or more days per week. The employee ☐ **is**, ☐ **is not** required to be in the hearing conservation program on the basis of job related noise exposure. Periodic noise monitoring ☐ **is**, ☐ **is not** required.

Interviewer: _____ Date: _____

IMPORTANT: Send copy to Occupational Medicine Clinic & SHSD Safety Engineering Group when investigation is in response to an STS.

The only official copy is on-line at the SHSD IH Group website.
Before using a printed copy, verify that it is current by checking the document issue date on the website.

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Attachment 8.4

See next Page

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EMPLOYEE NOTIFICATION FORM OF SHSD EVALUATION OF WORKPLACE EXPOSURE

| | |
|-------------------------------|-------------------------|
| Employee Name: | BNL Number: |
| Industrial Hygiene Evaluator: | Evaluator Signature: |
| Date: | IH Service File Number: |

The Occupational Medicine Clinic notified the Industrial Hygiene Group of BNL's Safety and Health Services Division that you received a hearing test and the results indicate a significant threshold shift (STS) in your hearing acuity as defined by the current Occupational Safety and Health Administration (OSHA) criteria.

The IH Group conducted an evaluation of your current and past work place conditions (job responsibilities and exposures) as well as use of personal protective equipment through interviews with you and your supervisor. Ambient and personal noise monitoring was conducted as necessary to determine the extent to which the workplace may currently contribute to any loss and a determination report has been provided to the clinic.

- ☐ It has been determined that the loss does not appear to be work related and no additional measures are recommended. (i.e. workplace exposures did not exceed occupational exposure limits)
- ☐ It has been determined that the loss may have been work related, however, exposures above the BNL occupational exposure limits are not anticipated in the future.
- ☐ It has been determined that the loss may be work related and you may still be exposed above the BNL occupational exposure limits. The following recommendations regarding the proper use and care of personal protective equipment are provided to assist in lowering future exposures.

| Condition | Response |
|---|---|
| Employee not using PPE | a) Train in hearing protector use and care (see reverse side) b) Fit with appropriate hearing protectors |
| Employee already using hearing protection | a) Re-fit (see reverse side)) b) Re-train in hearing protector use and care (see reverse side) c) Provide hearing protection with greater attenuation |

The following information is presented to assist you in using earplug and earmuff, hearing protection properly. For additional information or instruction in using other types of PPE visit the BNL Industrial Hygiene web site or contact the IH Group.

(over)

BROOKHAVEN NATIONAL LABORATORY
Safety & Health Services Division
INDUSTRIAL HYGIENE GROUP

IH96175
Attachment 8.4

Investigation/Evaluation of Standard Threshold Shifts

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EARPLUGS: The Roll Down: Preparing A Foam Earplug For Insertion

Hands and plugs should be clean prior to use. Begin by rolling the plug into a very thin crease-free cylinder. The cylinder should be as small in diameter as possible, that is, *as tightly compressed as you can make it*. Do not worry about hurting the plug — it is designed to be compressed in this way. Crease-free rolling is accomplished by squeezing lightly as you begin rolling, then applying progressively greater pressure as the plug becomes more tightly compressed. Make sure you roll (not twist), the plug into a cylinder rather than any other shape such as a cone or a ball. The plug is best rolled between the fingertips. One method is illustrated in Figures 1 and 2, with an alternative in Figure 3. Another option, for those with less finger strength, is to use the thumbs and forefingers of both hands as shown in Figure 4.



Once the plug has been properly rolled and compressed, immediately insert it well into the ear canal. The importance of compressing the plug tightly is that insertion into the ear canal can only be achieved when the plug's diameter is less than the canal's. The plug then slides easily into place (Figure 5). As with all earplugs, fitting is easier if the ear canal is straightened and enlarged by pulling the outer ear (pinna) outward and upward during insertion (see Figure 6). Pull the pinna firmly, usually in the direction the ear extends from the head. Don't just press it flat against the skull.

Plugs should be inserted into the right ear using the right hand and into the left ear with the left hand. The pinna should be pulled with the opposite hand by reaching behind or over the head. This allows the hand inserting the plug to have the best line of approach for proper fitting.

After insertion, hold the plug in place with a fingertip for a few moments until it begins to expand and block the noise. Once a plug has begun to expand, neither pushing nor twisting it will improve its fit. If the initial fit is inadequate, remove the plug, re-roll it, and try again. Occasionally when a foam plug is first inserted, it may be slightly uncomfortable if fitted deeply. Wait 30 seconds or so for it to expand to see if the discomfort subsides; if not, withdraw the plug slightly.

EAR MUFFS: Proper placement and use limitations.

Headband should be on top of head for best results. Ear cup cushions must fit well around temples of eyeglasses. Best results are obtained when the temple bar of glasses are not covered. Remove excess hair from under the ear cup cushions. Do not bend, alter or modify any part of the headband, cups, inserts or ear cup cushions. Ear cup cushions that are hardened or damaged should be replaced. Follow manufacturer's instructions for cleaning, care and maintenance. When earmuffs are correctly worn, your voice should sound muffled to you as if you are talking inside a barrel.

